

DUPLICATE



Test Certificate for Plywood

Certificate No.:

6590 HEL

Page 1 of 1

General Data Plandienst / Matthias Felsch, Tannheim, Germany VSO11042
Ordered by Order no.
Koskisen Oy, birch product industry, Hirvensalmi, Finland
Manufacturer
Aviation plywood
Item
477 / 1073.25 m² 06.-07.06.2011
total number / area Date of test

Test requirements Rules for classification and Construction, II – Materials and Welding, Part 2, Chapter 2.

Marking by Angular GL stamp

Manufacturer's symbol

Aircraft plywood	
Strength group	F 1
Type	Birch GL I / II
Germanischer Lloyd	
Date	06.-07.06.2011
Certificate no.	6590 HEL

Koskisen Oy
Quality
Thickness
Ply

Remarks The results of the individual testing are available at Germanischer Lloyd. The attached list gives information on type of plywood, plate scantlings and numbers of plates, as well as mean values of plywood and gluing strength of tested plates.

This is to certify that the material as described in the attached Particulars has been tested by our Surveyor. The test results complied with the Material Rules of Germanischer Lloyd.

This Certification is only valid in connection with the attached document: F149AE

Helsinki, 16.06.2011
Place/Date



Seppo Liukkonen
Signature of GL Surveyor

Enclosures

DUPLICATE

Listing of the tested plywood

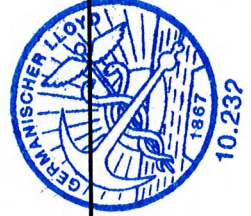
GL

Supplemental sheet 1 for certificate No.:

6590 HEL
Page 1 of 1[illegible]

Test Report									
Appendix to Certificate No. 6590 HEL									
Supplemental sheet 2 from 06.-07.06.2011									
Aircraft Plywood Manufacturer: Koskisen Oy									
Plywood - Tensile test									
Requirements									
Longitudinal 70,0 N/mm ² Transverse 45,0 N/mm ²									
Added 140,0 N/mm ²									
Lap-Shear test									
Wet test 2,0 N/mm ²									
Test No Width Thickness Area N N/mm2 Average N N/mm2 Average Width Length Area N N/mm2 Bonding % Average									
P1 25,0 0,600 15,0 1739,97 116,0 1294,23 86,3 151,10 75,0 25,0 3,0 2,0 100									
0,6 mm 1763,03 117,5 1159,74 77,3 175,09 2,3 100									
3 Ply 1598,27 106,6 1219,74 81,3 147,05 2,0 100									
20 Sheet 155,25 2,1 100									
Moisture 4,25 % 195,0 N/mm ² 152,68 2,0 100									
P2 25,0 0,800 20,0 1985,17 99,3 1730,51 86,5 265,51 75,0 25,0 3,0 3,5 100									
0,8 mm 2432,47 121,6 1721,17 86,1 206,52 2,8 100									
3 Ply 2372,99 118,6 1417,32 70,9 248,70 3,3 100									
32 Sheet 217,36 2,9 100									
Moisture 6,25 % 194,3 N/mm ² 239,18 3,2 100									
P3 25,0 1,000 25,0 2406,79 96,3 1766,43 70,7 264,31 100,0 25,0 4,0 2,6 100									
1,0 mm 2634,92 105,4 2072,88 82,9 259,42 2,6 100									
3 Ply 2599,84 104,0 1943,56 77,7 306,92 3,1 100									
62 sheet 295,62 3,0 100									
Moisture 5,63 % 179,0 N/mm ² 288,22 2,9 100									
P4 25,0 1,000 25,0 3484,25 139,4 2008,70 80,3 252,28 100,0 25,0 4,0 2,5 100									
1,0 mm 3279,65 131,2 2017,65 80,7 205,90 2,1 100									
3 Ply 2908,29 116,3 1778,99 71,2 201,15 2,0 100									
62 sheet 215,10 2,2 100									
Moisture 6,75 % 206,4 N/mm ² 266,55 2,7 100									
P5 25,0 1,200 30,0 3364,56 112,2 2383,28 79,4 278,13 100,0 25,0 4,0 2,8 100									
1,2 mm 3328,40 110,9 2960,00 98,7 288,03 2,9 100									
3 Ply 3836,73 127,9 1966,98 65,6 292,28 2,9 100									
65 sheet 284,81 2,8 100									
Moisture 5,68 % 198,2 N/mm ² 248,56 2,5 100									
P6 25,0 1,200 30,0 2910,26 97,0 2230,93 74,4 302,05 100,0 25,0 4,0 3,0 100									
1,2 mm 2920,25 97,3 2218,77 74,0 264,09 2,6 100									
3 Ply 2898,00 96,6 2285,02 76,2 298,71 3,0 100									
65 sheet 312,59 3,1 100									
Moisture 5,74 % 171,8 N/mm ² 294,76 2,9 100									

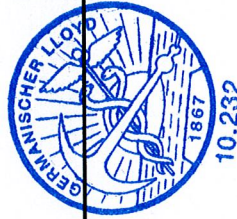
Plywood - Tensile test										Lap-Shear test						
Requirements		Longitudinal				Transverse				Wet test						
		Added		140,0 N/mm ²		70,0 N/mm ²		45,0 N/mm ²		2,0 N/mm ²						
Test No	Width	Thickness	Area	N	N/mm2	Average	N	N/mm2	Average	Width	Length	Area	N	N/mm2	Bonding %	Average
P7	25,0	1,500	37,5	3220,13	85,9		2335,55	62,3		25,0	4,0	100,0	203,39	2,0	100	
1.5 mm				3121,33	83,2	82,7	2113,54	56,4	61,4				220,82	2,2	100	
3 Ply				2967,44	79,1		2455,78	65,5					200,66	2,0	100	2,29
63 sheet													257,06	2,6	100	
Moisture		6,25 %		Added		144,1 N/mm ²							264,34	2,6	100	
P8	25,0	1,500	37,5	3392,65	90,5		2270,73	60,6		25,0	4,0	100,0	215,83	2,2	100	
1.5 mm				3287,21	87,7	89,7	2245,48	59,9	60,7				247,49	2,5	100	
3 Ply				3414,19	91,0		2308,44	61,6					243,53	2,4	100	2,48
63 sheet													256,59	2,6	100	
Moisture		6,38 %		Added		150,4 N/mm ²							274,77	2,7	100	
P9	25,0	1,500	37,5	3847,91	102,6		3063,13	81,7		25,0	4,0	100,0	379,27	3,8	100	
1.5 mm				3431,25	91,5	95,5	3151,66	84,0	87,5				359,99	3,6	100	
5 Ply				3460,82	92,3		3629,57	96,8					369,87	3,7	100	3,62
54 sheet													368,38	3,7	100	
Moisture		6,19 %		Added		183,0 N/mm ²							334,87	3,3	100	
P10	25,0	1,500	37,5	3574,42	95,3		3602,16	96,1		25,0	4,0	100,0	417,49	4,2	100	
1.5 mm				3834,69	102,3	102,7	3485,75	93,0	93,9				463,98	4,6	100	
5 Ply				4148,31	110,6		3470,94	92,6					427,41	4,3	100	4,22
54 sheet													385,49	3,9	100	
Moisture		5,93 %		Added		196,6 N/mm ²							415,27	4,2	100	
P11	25,0	2,000	50,0	5114,00	102,3		4168,67	83,4		25,0	4,0	100,0	382,01	3,8	100	
2.0 mm				6015,86	120,3	113,2	4247,12	84,9	84,8				403,87	4,0	100	
5 Ply				5848,86	117,0		4298,62	86,0					363,41	3,6	100	3,87
87 sheet													390,91	3,9	100	
Moisture		5,76 %		Added		198,0 N/mm ²							393,40	3,9	100	
P12	25,0	2,000	50,0	4806,49	96,1		4444,95	88,9		25,0	4,0	100,0	350,66	3,5	100	
2.0 mm				4789,58	95,8	96,7	4825,60	96,5	92,6				335,56	3,4	100	
5 Ply				4905,77	98,1		4619,13	92,4					344,92	3,4	100	3,44
87 sheet													332,75	3,3	100	
Moisture		7,09 %		Added		189,3 N/mm ²							355,07	3,6	100	



DUPLICATE

Germanischer Lloyd

Requirements		Plywood - Tensile test				Lap-Shear test			
		Longitudinal		Transverse		Wet test		2,0 N/mm ²	
Test No	Width	Thickness	Area	N	Average	N	Area	N	Average
P13	25,0	2,500	62,5	5226,66	83,6	4245,68	67,9	259,52	2,1
2.5 mm				4716,74	75,5	4354,34	69,7	299,06	2,4
5 Ply				4981,26	79,7	4899,36	78,4	273,26	2,2
33 sheet								289,50	2,3
Moisture	5,62 %			Added	151,6 N/mm ²			257,37	2,1
P14	25,0	3,000	75,0	6483,05	86,4	4731,21	63,1	262,08	2,1
3.0 mm				6534,03	87,1	4643,80	61,9	270,93	2,2
6 Ply				5881,79	78,4	4949,79	66,0	270,36	2,2
33 sheet								274,59	2,2
Moisture	6,00 %			Added	147,7 N/mm ²			252,84	2,0
P15	15,0	4,000	60,0	4475,80	74,6	5030,18	83,8	388,23	2,6
4.0 mm				4313,74	71,9	5090,91	84,8	417,83	2,8
8 Ply				4635,59	77,3	5539,88	92,3	401,00	2,7
22 sheet								395,73	2,6
Moisture	5,88 %			Added	161,6 N/mm ²			398,43	2,7
P16	15,0	6,000	90,0	6347,89	70,5	8071,57	89,7	661,70	3,3
6.0 mm				6757,73	75,1	7201,01	80,0	639,70	3,2
12 Ply				6767,93	75,2	7968,77	88,5	597,30	3,0
6 sheet								620,21	3,1
Moisture	5,64 %			Added	159,7 N/mm ²			675,38	3,4



Seppo Liukkonen

Plandienst

Järvelä and Hirvensalmi, 06.-07.06.2011